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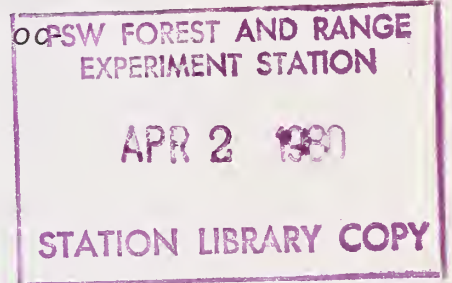
Rocky Mountain Forest and
Range Experiment Station

A New Gila Topminnow Locality in Southern Arizona

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A new Gila topminnow (Atheriniformes:Poeciliidae) locality discovered in an intermittent stream on the Coronado National Forest should be protected from future mineral and water mining, off-road vehicles, grazing, and the introduction of nonnative fish species if it is to persist in this desert environment.

Keywords: endangered species, *Poeciliopsis occidentalis*



Management Recommendations

A number of actions could be taken to both maintain and expand a newly discovered population of Gila topminnow, *Poeciliopsis occidentalis occidentalis*, in Redrock Canyon on the Coronado National Forest. Since the area is grazed by domestic livestock, fencing of 150 to 200 m of stream channel may be desirable to maintain both the Gate Spring and Redrock Ranch subpopulations. Mining has long been practiced in the area, and exploratory bore holes were observed in Redrock Canyon. The reach of stream above and within the area inhabited by the Gila topminnow should be protected from any negative impacts from future mining operations, including water mining (groundwater pumping for irrigation or domestic supply). A stock tank at

the headwaters of Redrock Canyon and other impoundments within the area should be resurveyed to determine the abundance and distribution of the mosquitofish, *Gambusia affinis affinis*. This competitive species should be removed from the drainage. Vehicular travel on a primitive road up the stream channel to Gate Spring should be prohibited in the reach of stream containing topminnows.

The endangered status of this diminutive native fish species should stimulate continued efforts both to maintain natural populations and to reintroduce it into suitable habitats within its natural range. Existing documents delineate such actions (Rickel 1979) and, in light of the fact that only one other population of the Gila topminnow occurs on federal lands, the Redrock system presents an excellent opportunity to accomplish both maintenance and introduction activities. During summer when topminnows will normally become abundant in this system and if adjacent springs maintain suitable surface water, gravid female topminnows could be transplanted on an experimental basis and monitored to insure perpetuation of the species and expansion of its range.

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Past Population Discoveries

Although the Gila topminnow was once one of the most common, low desert, native fish species in Arizona, it became greatly reduced in both range and number (Minckley et al. 1977), resulting in its designation as an endangered species (U.S. Department of the Interior 1976). It now occurs naturally in only seven localities—six in the Santa Cruz River drainage and one along the Gila River near Bylas. Four localities are on private land, and one each is on Indian reservation, state, and Bureau of Land Management lands.

Despite several extant introduced populations, attempts to reestablish this livebearer in its native range have met with little success (Minckley 1969). This is related to factors such as geographic location of introduction sites, permanence of surface waters and vagaries of flooding, and the presence of nonnative fishes, principally mosquitofish.

Two of the localities—Bylas Springs (Johnson and Kobetich 1968) and Cocio Wash (Contantz 1979)—were discovered within the last decade. More recently in the San Pedro River Valley, an eighth natural population was eliminated by man through water mining within a few months of discovery (McNatt 1979).

The New Population

We first observed topminnows in Redrock Canyon in winter 1978, although they had been reported in this intermittent stream as early as the late 1960's. Water temperature was 5° C, and only a few fishes were observed in a mainstream pool. It was assumed they represented stock from a more permanent upstream habitat. Initial attempts to locate such a habitat were in March 1979 by personnel from Arizona Game and Fish Department, Arizona State University, and the USDA Forest Service. No topminnows were discovered at that time.

On May 8, 1979, the second author observed Gila topminnows in a side-channel pool (10 by 2 m; 0.5 m deep; elevation 1,348 m) downstream from Redrock Ranch, and about 0.2 km upstream from a 2-m bedrock waterfall (fig. 1). The pool was thickly overgrown with aquatic vegetation. Air temperature (36° C) exceeded water temperature (22° C) on that day, and pH was 7.5. No fish were observed in the adjacent mainstream; however, topminnows (mostly young-of-year) were abundant there in early July 1979.

Several springs in and adjacent to Redrock Canyon (e.g., Cottonwood Springs; fig. 1) were examined on May 18-19, but no fishes were sighted. These should be re-examined for topminnow during summer when populations normally become abundant because of the species' prolific reproductive capacity.

During the late May visitation, Gila topminnows were collected by electrofishing from a 150-m reach of mainstream adjacent to and below Gate Spring (fig. 1). The total population, presumably reduced by harsh winter conditions (i.e., cold weather and high runoff) was estimated to be less than 100 fish. Five voucher specimens were preserved (federal permit PRT-8-238-C).



Figure 1.—Map of Redrock Canyon indicating the reaches of stream containing Gila topminnow (boxes) and other springs in the drainage system.

Selected habitat parameters were measured (see tabulation below) in the area of Gate Spring (1,395 m elevation). The area was characterized by a channel of bedrock and numerous inflowing seeps (fig. 2). Water in one side-channel, elevated spring (fig. 3) was very hard and high in conductance. Water in the mainstream (discharge 0.44 m³ per minute) was less than one-third as hard and only one-half as saline. Water temperatures ranged from 14° C (7:00 p.m.) to 24° C (1:00 p.m.). The stream was 1 to 2 m wide, with riffles seldom exceeding 15 cm and pools 30 cm deep. There were extensive algal mats (fig. 4).

Selected physico-chemical characteristics of Redrock Creek below Gate Spring and of an unnamed elevated side-channel spring were as follows:

Physical-chemical factor	Spring	Stream
CO ₂	60 mg/l	40 mg/l
Specific conductance	2,300 mmhos	1,200 mmhos
Ca ⁺⁺ hard (as CaCO ₃)	1,050 mg/l	350 mg/l
Mg ⁺⁺ hard (as CaCO ₃)	150 mg/l	170 mg/l
Total hard (as CaCO ₃)	1,200 mg/l	520 mg/l
Total alkalinity (as CaCO ₃)	170 mg/l	200 mg/l
pH	7.4	8.5

Topminnow occupied areas of algal mats almost exclusively, particularly retreating there upon our approach to the stream. No other fishes were present in the reach of stream, but adult longfin dace, *Agosia chrysogaster*, were observed below the falls near Redrock Ranch, and young-of-year dace were noted in late May about 6 km downstream. In March 1979, a headwater tank about 7 km upstream from Gate Spring was seined. Small (<150 mm)



Figure 2.—Photo (looking downstream) of the 150 m of stream in which five Gila topminnow were collected on May 18, 1979.



Figure 3.—Salt spring above and beside Redrock Creek in area of Gate Spring. See the tabulation for water chemistry. Arrow in (a) indicates position of spring pictured in (b).

a



b



Figure 4.—Example of extensive algal mats utilized by Gila topminnow for escape cover and as shade under summer conditions.

largemouth bass, *Micropterus salmoides*, were abundant, and a single mosquitofish was captured.

On August 23, 1979, we visited the Redrock Ranch and Gate Spring areas of Redrock Canyon. The stream had recently flooded (estimated flow, 500 m³ per minute). The side-channel pool below Redrock Ranch had been severely eroded, but topminnows persisted there as well as in small, isolated schools in the mainstream where flow was 0.5 m³ per minute. Topminnows were more abundant in the Gate Spring area than they were in May; however, the population level was lower than expected, apparently because of the flooding.

Literature Cited

- Contantz, George Doran. 1979. Life-history patterns of a livebearing fish in contrasting environments. *Oecologia* 40(2):189-201.
- Johnson, James E., and Gail Kobetich. 1968. A new locality for the Gila topminnow, *Poeciliopsis occidentalis* (Poeciliidae). *Southwestern Naturalist* 14(3):368.
- McNatt, Randy. 1979. Discovery and loss of a new locality for the Gila topminnow, *Poeciliopsis occidentalis* (Poeciliidae). *Southwestern Naturalist* 24(3): 555-556.
- Minckley, W. L. 1969. Attempted re-establishment of the Gila topminnow within its former range. *Copeia* 1969: 193-194.
- Minckley, W. L., John N. Rinne, and James E. Johnson. 1977. Status of the Gila topminnow and its co-occurrence with mosquitofish. USDA Forest Service Research Paper RM-198, 8 p. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
- Rickel, Bryce. 1979. The status and management proposals for the threatened and endangered fishes of the Coronado National Forest. File 2630, Coronado National Forest, 16 p.
- U.S. Department of the Interior. 1976. Endangered and threatened wildlife and plants (republication of list of species). *Federal Register* 41(208):47, 180-47, 198.